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Navy Researchers Collaborate on Five-year Dengue Study in Peru

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Lt. Robert D. Hontz, Naval Medical Research Unit No. 6



A University of California, Davis (UCDavis)/ U.S. Naval Medical Research Unit No. 6 (NAMRU-6) collaborative study published in Proceedings of the National Academy of Sciences (PNAS) provided evidence that human movement contributes to the spread of DENV infections starting outbreaks.

After many years of researching dengue disease epidemiology, investigators are just now beginning to understand in greater detail the underlying mechanisms and trends directing such outbreaks.

It is well known that the dengue virus (DENV)-infected female mosquito of the species *Aedes aegypti*, transfers the virus to humans while blood feeding; however, evidence is not yet available as to how efficiently DENV-infected people are able to transmit the virus to healthy mosquitoes. Since *Aedes aegypti* mosquitoes only travel relatively short distances during their lifetimes (~100 meter radius), it is logical that dengue outbreaks would spread over large distances primarily by human movement, where infected individuals are bitten by healthy mosquitoes.

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It is well known that the dengue virus (DENV)-infected female mosquito of the species *Aedes aegypti*, transfers the virus to humans while blood feeding.

Two important questions remain: to what extent can DENV-positive persons infect healthy mosquitoes? And, what impact does this have on disease transmission to eventually spark outbreaks? This National Institutes of Health-funded five-year project, managed by Dr. Thomas W. Scott of UC-Davis, will address these questions using novel field methods, laboratory techniques, and advanced computer modeling programs.

Subject-matter-experts from NAMRU-6 and nearly a dozen academic institutions will carry out this work exclusively in the Peruvian city of Iquitos, where UC-Davis and NAMRU-6 have been conducting dengue disease surveillance for two decades.



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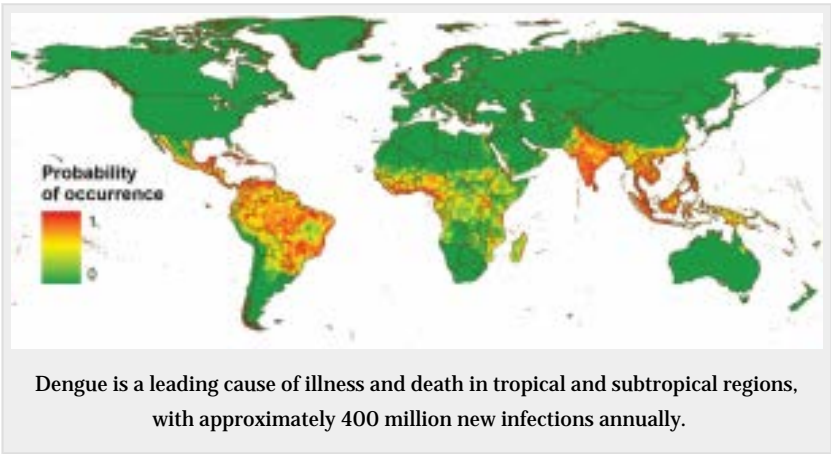
Investigators will lend their expertise in the fields of epidemiology, infectious disease ecology, clinical medicine, virology, immunology, entomology, behavioral science and mathematical modeling ... making it truly an interdisciplinary and transdisciplinary project.

Three smaller projects called “cores,” will focus on specific aims that relate to the overall goal. The purpose of the first core is to quantitatively define the relationship between disease severity and the variation of a person’s contribution to infect healthy mosquitoes.

The second core will assess the relative and joint contributions of epidemiological, entomological and socio-behavioral heterogeneity to DENV transmission dynamics. The third core will analyze data from the first two cores in order to predict risk and target

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effective public health measures to minimize DENV spread.



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Over the next several years, NAMRU-6 scientists and clinicians will be on the front lines of this valuable research effort, whose recommendations for more effective public health measures to combat dengue disease will better protect the warfighter deployed to high risk locations.

According to the [U.S. Centers for Disease Control and Prevention](#) more than one-third of the world's population, live in areas at risk for contracting dengue. Dengue has emerged as a worldwide problem only since the 1950s. Dengue is a leading cause of illness and death in tropical and subtropical regions, with approximately 400 million new infections annually. Dengue is caused by any one of four related viruses transmitted by *Aedes* mosquitoes. There are currently no vaccines to prevent dengue infection, so protective measures to avoid mosquito bites are the most effective way to prevent contracting the disease.

When infected, early recognition and prompt supportive treatment can substantially lower the risk of medical complications and death. Although dengue disease is rare within the continental United States, it is endemic to Puerto Rico and many popular Latin American, southeast Asian and Pacific island tourist destinations.

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